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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,038	07/08/2003	Young-Soo Kim	29926/39505	3909

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EXAMINER

SMITH, BRADLEY

ART UNIT PAPER NUMBER

2824

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/615,038

Applicant(s)

KIM, YOUNG-SOO

Examiner

Bradley K Smith

Art Unit

2824

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3 is/are rejected.
- 7) ☒ Claim(s) 2,4-7 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/8/03
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: search notes.

DETAILED ACTION

Claim Objections

1. Claim 4 and 6 are objected to because of the following informalities: TiCl_4 should be TiCl_4 . Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Park et al. (US Pregrant Publication 2003/0003649). Park et al. disclose forming a lower electrode on a semiconductor substrate; forming a dielectric layer on the lower electrode; loading the semiconductor substrate containing the dielectric layer into a deposition chamber (the examiner understands that this step would be inherent, and well known to one of ordinary skill in the art); nitriding a surface of the dielectric layer while NH_3 gas is flowed into the deposition chamber (paragraph 0021); and forming an upper layer by using a source gas NH_3 , containing Titanium (Ti) on the nitrated surface of the dielectric layer through an atomic layer deposition (ALD) method (paragraph 0028).

Art Unit: 2824

4. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Sneh et al. (US Patent 6,551,399). With regards to claim 1, Sneh et al. disclose forming a lower electrode on a semiconductor substrate; forming a dielectric layer on the lower electrode; loading the semiconductor substrate containing the dielectric layer into a deposition chamber (the examiner understands that this step would be inherent, and well known to one of ordinary skill in the art); nitriding a surface of the dielectric layer while NH_3 gas is flowed into the deposition chamber ; and forming an upper layer by using a source gas NH_3 , containing Titanium (Ti) on the nitrated surface of the dielectric layer through an atomic layer deposition (ALD) method (see example 19). With regards to claim 3, Sneh et al. disclose loading a semiconductor substrate containing a formed on a lower electrode into a dielectric layer deposition chamber (the examiner understands that this step would be inherent, and well known to one of ordinary skill in the art) ; and forming an upper electrode containing Titanium (Ti) on the dielectric layer through an atomic layer deposition (ALD) method using a source gas NH_3 (example 19).

Allowable Subject Matter

5. Claims 2 and 4-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record neither teaches nor suggests flowing the NH_3 source gas in at 300 sccm to 1000 sccm for 10 to 120 seconds (claim 2), wherein the flow rate is

Art Unit: 2824

controlled by opening a valve (claims 4 and 5), TiCl_4 feeding time is mandated to be timed, wherein initial 50 cycles lapse for about 0.05 seconds to about 0.2 seconds and the rest lapses for about 0.5 seconds to about 0.2 seconds (claim 6), absorbing the TiCl_4 onto the dielectric layer by feeding the TiCl_4 ; feeding the TiCl_4 gas in order to make it absorbed on the dielectric layer; purging a remnant of the TiCl_4 gas remaining after the absorption; feeding NH_3 gas on a surface of the dielectric layer on which the TiCl_4 is already absorbed; and purging a remnant of the NH_3 gas and a by-product which is formed by a chemical reaction between the NH_3 and the TiCl_4 (claim 7).

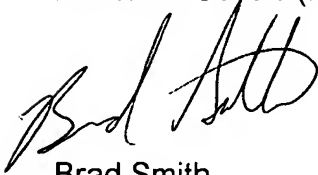
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K Smith whose telephone number is (571) 272-1884. The examiner can normally be reached on 10-6 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2824

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Brad Smith", is positioned above the printed name.

Brad Smith
Patent Examiner